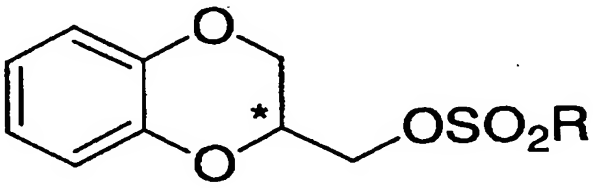
CLAIMS

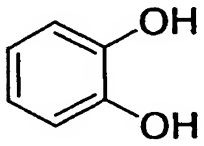
1. A method for producing an optically active 1,4-benzodioxane derivative represented by general formula (1):



(1)

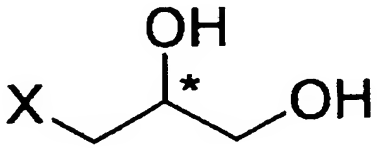
(where * represents an asymmetric center), the method comprising:

a first step of allowing catechol represented by formula (2):



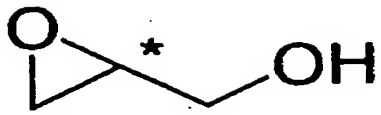
(2)

to react with an optically active 3-halogeno-1,2-propanediol represented by general formula (3):



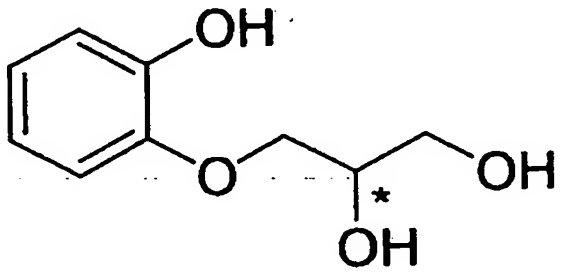
(3)

(where X represents halogen atom; and * is the same as above), or an optically active glycidol represented by formula (4):



(4)

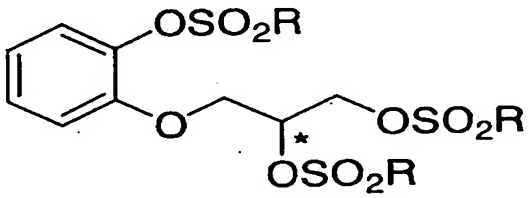
(where * is the same as above), in a solvent in the presence of a base, to yield an optically active triol compound represented by formula (5):



(5)

(where * is the same as above);

a second step of allowing the resulting compound to react with a sulfonylating agent in the presence of a tertiary amine to form an optically active trisulfonate compound represented by general formula (6):



(6)

(where R represents an alkyl group having 1 to 12 carbon atoms or a phenyl group unsubstituted or substituted with a group having 1 to 12 carbon atoms; and * is the same as above); and

a third step of treating the resulting optically active trisulfonate compound with a base in a protic solvent or a mixed solvent of a protic solvent and an aprotic solvent to cause cyclization.

2. The method for producing an optically active 1,4-benzodioxane derivative according to Claim 1, wherein X represents a chlorine atom.

3. The method for producing an optically active 1,4-benzodioxane derivative according to Claim 1 and 2, wherein, in the first step, an alkali metal hydroxide is used as the base.

4. The method for producing an optically active 1,4-benzodioxane derivative according to Claims 1 to 3, wherein, in the first step, water is used as the solvent.

5. The method for producing an optically active 1,4-benzodioxane derivative according to any one of Claims 1 to 4, wherein, in the second step, the sulfonylating agent is arylsulfonyl chloride containing 6 to 12 carbon atoms or alkylsulfonyl chloride containing 1 to 12 carbon atoms.

6. The method for producing an optically active 1,4-

benzodioxane derivative according to Claims 1 to 4, wherein, in the second step, the sulfonylating agent is *p*-toluenesulfonyl chloride.

7. The method for producing an optically active 1,4-benzodioxane derivative according to any one of Claims 1 to 6, wherein, in the second step, a mixed amine containing triethylamine and *N,N,N,N*-tetramethyl-1,6-hexanediamine is used as the tertiary amine.

8. The method for producing an optically active 1,4-benzodioxane derivative according to any one of Claims 1 to 7, wherein, in the third step, sodium alkoxide containing 1 to 4 carbon atoms is used as the base.

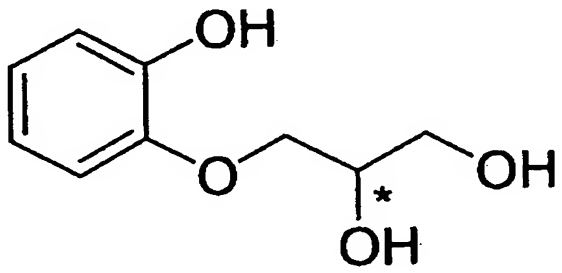
9. The method for producing an optically active 1,4-benzodioxane derivative according to Claim 8, wherein the sodium alkoxide is sodium methoxide.

10. The method for producing an optically active 1,4-benzodioxane derivative according to Claims 1 to 9, wherein, in the third step, a mixed solvent of an alcohol containing 1 to 4 carbon atoms and tetrahydrofuran is used as the mixed solvent of a protic solvent and an aprotic solvent.

11. The method for producing an optically active 1,4-benzodioxane derivative according to Claim 10, wherein the mixed solvent of a protic solvent and an aprotic solvent is a mixed solvent of methanol and tetrahydrofuran.

12. The method for producing an optically active 1,4-benzodioxane derivative according to Claims 1 to 11, wherein the optically active 3-halogeno-1,3-propanediol has (R) configuration.

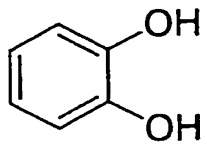
13. A method for producing an optically active triol compound represented by formula (5):



(5)

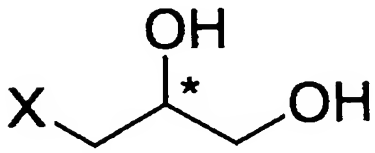
(where * represents an asymmetric center), the method comprising a step of:

allowing catechol represented by formula (2):



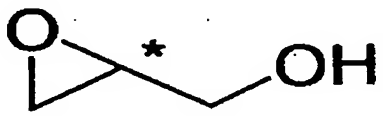
(2)

to react with an optically active 3-halogeno-1,2-propanediol represented by general formula (3):



(3)

(where X represents a halogen atom; and * is the same as above), or an optically active glycidol represented by formula (4):



(4)

(where * is the same as above), in a solvent in the presence of a base.

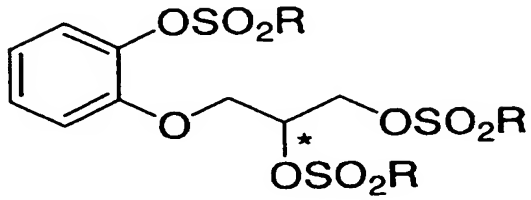
14. The method according to Claim 13, wherein sodium hydroxide is used as the base.

15. The method according to Claim 13 and 14, wherein water is used as the solvent.

16. The method according to Claims 13 to 15, wherein X represents a chlorine atom.

17. A method for producing an optically active

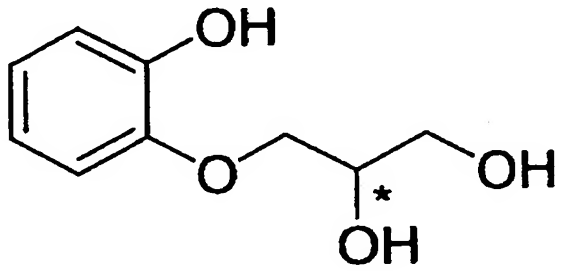
trisulfonate compound represented by general formula (6):



(6)

(where R represents an alkyl group having 1 to 12 carbon atoms or a phenyl group unsubstituted or substituted with a group having 1 to 12 carbon atoms; and * is the same as above), the method comprising a step of:

allowing an optically active triol compound represented by general formula (5):



(5)

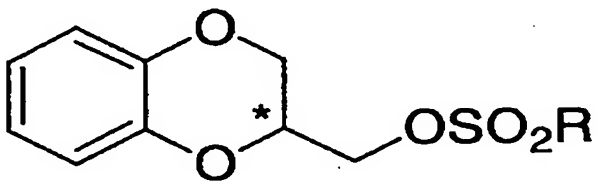
to react with a sulfonylating agent in the presence of a tertiary amine.

18. The method according to Claim 17, wherein the sulfonylating agent is arylsulfonyl chloride containing 6 to 12 carbon atoms or alkylsulfonyl chloride containing 1 to 12 carbon atoms.

19. The method according to Claim 18, wherein the sulfonylating agent is *p*-toluenesulfonyl chloride.

20. The method according to any one of Claims 17 to 19, wherein a mixed amine of triethylamine and *N,N,N,N*-tetramethyl-1,6-hexanediamine is used as the tertiary amine.

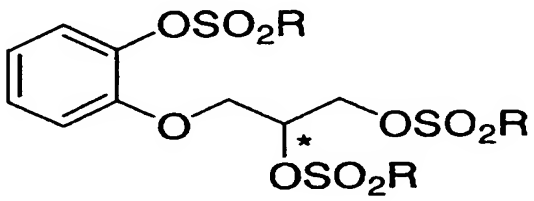
21. A method for producing an optically active 1,4-benzodioxane derivative represented by formula (1):



(1)

(where * represents an asymmetric center), the method comprising a step of:

treating an optically active trisulfonate compound represented by general formula (6):



(6)

(where * is the same as above), with a base in a protic solvent or a mixed solvent of a protic solvent and an aprotic solvent to cause cyclization.

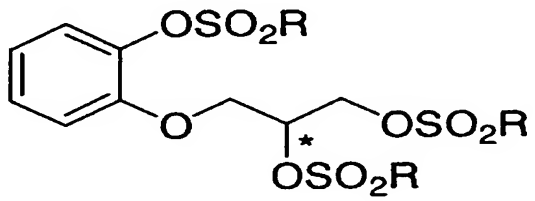
22. The method according to Claim 21, wherein sodium alkoxide containing 1 to 4 carbon atoms is used as the base.

23. The method according to Claim 21, wherein the base is sodium methoxide.

24. The method according to Claims 21 to 23, wherein a mixed solvent of an alcohol containing 1 to 4 carbon atoms and tetrahydrofuran is used as the mixed solvent of a protic solvent and an aprotic solvent.

25. The method according to Claims 21 to 23, wherein a mixed solvent of methanol and tetrahydrofuran is used as the mixed solvent of a protic solvent and an aprotic solvent.

26. An optically active trisulfonate derivative represented by general formula (6):



(6)

(where R represents an alkyl group having 1 to 12 carbon atoms or a phenyl group unsubstituted or substituted with a group having 1 to 12 carbon atoms).

27. The derivative according to Claim 26, wherein R represents *p*-tolyl.